The Builder.

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SOME time ago we stated broadly the conclusions which the General Board of Health had arrived at in their Report on the supply of water to the metropolis, signed, "Carlisle, Ashley, Edwin Chadwick, and T. Southwood Smith." This Report contains a large mass of information, set forth in 325 closely-printed pages, relating as well to drainage as to the more prominent object of inquiry, and we propose now to turn over the leaves and condense for the advantage of our readers some of the more salient statements, without seeking to connect them. According to the returns made, the water companies supply 270,581 private houses; and as the total number of houses returned under the income-tax assessments for the metropolis is 288,037, there appear to be 17,456 houses unsupplied with water. Previous inquiries serve to show that the number is even much larger. The daily quantity of water, according to the same returns, pumped into the metropolis, is upwards of 44,000,000 gallons, or more than would form a lake equal to the area of St. James's-park 30 inches deep. It could be delivered in twenty-four hours by a brook 9 feet wide and 3 feet deep, running at the rate of a little more than 2 miles per hour: three sewers of 3 feet in diameter, having a proper fall, would suffice for its removal when soiled, a fact which of course bears materially on the question of size of sewers.

The miserable condition of the poorer classes in respect of water is shown forcibly, both as to the want of any, and the badness of the water where they have it. Mr. Chalice, a surgeon, asserts positively, with reference to the connection between bad water and the cholera, that in parts of Bermondsey, where deep spring water alone was used, and where such water was free from the effect of percolation from the drainage, persons escaped the cholera altogether.

Amongst the evils of an intermittent supply entailing the storing of water in vessels, must be placed the fact (made evident during this inquiry), that *water exposed to an impure and noxious atmosphere, absorbs noxious and impure matters, and thus becomes injurious to health.*

We have at various times had occasion to speak of the effect of water on lead, with the injurious results of the infusion on the system, and have pointed out that pure water had a more powerful action on lead pipes and cisterns than impure. This has been urged, it appears, by some of the witnesses, who would keep the supplies "hard," as they are. The Report says:—

"There can be no doubt of the more powerful action of soft water upon lead under given circumstances, which circumstances, however, we find, from experience on a large scale, seldom or never occur under a proper system of distribution. Some fatal accidents have been occasioned by the fall of leaves in leaden gutters and cisterns, the infusion of which appears to have caused powerful decomposition. The use of lead piping and lead cisterns has long been objected to, and the remedy would be the disuse of that metal. Iron piping is altogether better and cheaper than lead, and may now, it appears, at no great additional expense, be protected from oxidation by an earthenware glaze. But for the *obstinate prejudice of professional men and builders in favour of the most expensive materials*, earthenware would have been manufactured and used for the distribution of water. It was so used by the Romans. Vitruvius recommends it as far preferable to lead: he shows that it was used for the distribution of water up to 100 feet of pressure."

"Professional men and builders" are with difficulty moved into a new course; but the *motive* for adherence to the old course here suggested is a wrong one: this is an error which has been long entertained and acted on by the able writer of the Report before us.

A witness from Paisley, where soft water has been introduced, says that corrosion in pipes takes place only under the intermittent supply, by the action of the atmosphere on the pipe in a damp state; and that an iron pipe constantly charged will not corrode at all, whether the water be hard or soft, and will last at least four times as long as a pipe where the air is admitted into it.

Other witnesses corroborate the fact that, with some waters, the wear of pipes by the intermittent supplies is frequently very rapid, the rationale being, that oxidation takes place whilst the pipe is empty, and that the oxide is swept away by the return of the water.

Professor Clark shows that accidents from the contamination of lead may be prevented by simple filtration. At a marine villa belonging to Lord Aberdeen, some of the servants suffered in health from lead in water derived from pipes. Sand filters were put up under his direction, and the result was satisfactory.

"I hold it in all cases (says the witness) to be dangerous to allow water to pass through any considerable length of lead pipes, or to allow water to remain for a long time even in short pipes. In the case of the marine villa before alluded to, the water came a considerable distance through lead pipes; I suppose above a quarter of a mile. The water in Aberdeen is brought from the iron mains in the streets into the houses by means of lead pipes: and in general without any disadvantage, because the supply from the pipes is constant, and the use of the stop-cock very frequent in a family."

To learn the difference of effect in cooking of hard and soft water, the Board called in M. Soyer, whose statements were very decisive. The result is to the effect, that by the use of Thames water *one-third more tea* is used in the metropolis than would be the case if the water were soft; and that in cooking generally soft water would effect great saving.

The "washing-day" is an annoyance appreciated by large masses of not merely the lower, but the middle classes,—an annoyance affecting happiness, comfort, health. The cost of this, in the aggregate, will startle those who consider it for the first time. This expense is greatly increased by the waste of soap occasioned by hard water; and to make this clear, some curious particulars are given in the Report, showing, first, the largeness of the item *washing* in a family's expenditure. In families of the middle class, the cost of washing amounts often to nearly one-twelfth or one-thirteenth of their income.

"The waste amounts to 25¼ ozs. of soap in the use of each 100 gallons of water of 16 degrees of hardness, over and above that which would be required with a water of 4 degrees of hardness; or, with the price of soap at 5d. the pound, causes an extra cost of 8d. on each 100 gallons, or 6s. 8d. on each 1,000 gallons; being more than 20 times the first cost of an economic water-supply, as furnished in several towns, or as might be furnished to the metropolis, allowing 7½ per cent. for the use of the capital required."

Mr. John Bullar arrives at the conclusion that the washing bills of London are nearly one shilling a week a head, or 5,000,000*l.* a year.

"The washing expenses of a middle-class family, inhabiting a house rented at 120*l.* a-year, and rated (high) at 100*l.* a-year, consisting of husband and wife, three children, and three servants, may be taken at not less than 20*s.* a-week, or more than half the rated rental; and from all that I have been able to learn, the proportion which washing expenses bear to rent is much greater in those families whose income is large enough to free them from the necessity of studying economy in matters of ordinary domestic expenditure. It is said that the average yearly value of the houses in London assessed under the Income-Tax is 40*l.*; and that the average number of persons to every inhabited house in London is 7·4. At one shilling a-week a-head the washing-bills of the persons inhabiting each of these houses would be within a very small fraction of 20*l.* a-year."

Returns show that the quantity of soap annually consumed in the kingdom is equal to seven-and-a-half pounds for each individual, and may be put at 3*s.* 4*d.* for each individual. Professor Clark comes to the conclusion that in London alone, a hard-water district, the consumption of each person is equal to about double this, or 6*s.* 8*d.*

From 800 to 1,000 tons of soap are used in London per month.

"If the importance of what is politically called an 'interest' be measured by the aggregate amount of the expenditure involved in it, then the washerwoman's interest is larger than the chief manufacturing interest of the country—the cotton and linen manufactures,—(at least as far as the home market is concerned)—inasmuch as far more money is expended in washing clothes than in the manufacture of the fabric or of the clothes themselves."

If we burnt our smoke, got rid of the dust in the streets, and obtained soft water, an amount of startling largeness would be annually saved to the Londoners, their clothes would wear longer, and the poor would not be driven to the dirt-concealing and evil-producing garments to which they have been forced.

At the Bolton Union, softening the water from five and a half degrees of hardness (or one-third the hardness of Thames water) to two degrees of hardness reduced the expense of soap and ashes from 2*l.* 10*s.* 1*d.* weekly to 1*l.* 11*s.* 9*d.* The same clothes which were washed in the country with soft water for 3*s.* 3*d.* cost in town with water from Chelsea Water Works, 10*s.* 10*d.*

Under the third head of the inquiry,—the mode of *removing* water after it has been used, the arguments in favour of small pipe drains are reiterated, and evidence quoted in favour of their superiority over large drains.

The statements made by Messrs. James Walker, W. Cubitt, and I. K. Brunel, on the City sewers, are attributed to their having trusted the reports of others, who have misled them, and in opposition to the opinions expressed by these engineers as to the size and form of sewers, various experiments are quoted. In one case, 150 houses were drained perfectly through one 6-inch unglazed earthenware pipe!

"It appeared from the gaugings of the run of water on ordinary days (and exclusive of storm-water), that the drainage of 1,200 houses occupied a space not larger than would pass a 5-inch pipe, proving that the actual drainage of 1,200 houses would go through a space less, by two-thirds, than that which, on the advice of various architects, was fixed by the Metropolitan Building Act as the minimum size of a drain for a single house. If, as appears probable, the flow of soil water from

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